Series-shunt bootstrapping preamplifier circuit for free space optics

Abstract

The signal level in an optical wireless receiver is weakest at the front-end due to the photo detector capacitance and appropriate design should be done to improve the receiver performance [1]. The optimum receiver performance can be achieved depends on the devices and design techniques used. Thus, this paper examines some of the issues involved in the design of front-end optical wireless receiver. Series-shunt bootstrap was investigated as the technique for mitigating the effects of the large capacitances associated with the photo detector. Optical wireless link or free space optics (FSO) require a large aperture and thus, the receiver is required to have a large detection area, which produces a high input capacitance and consequently reduced the bandwidth [1,2]. In order to maximize the bandwidth, we need to reduce Cin which is the summation of photodiode capacitance, Cd and amplifier input capacitance, Cs. On the other hand, it is necessary to reduce RL but the thermal noise element will increase when the load resistor is reduced.